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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,277	07/19/2001	Glenn W. Gale	BUR92000136US1	2205

7590 08/21/2003
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EXAMINER

WINTER, GENTLE E

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 08/21/2003

5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/909,277

Applicant(s)

GALE ET AL.

Examiner

Gentle E. Winter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment and Remarks

1. Applicant argued:

Energy is applied separating the “frozen fluid” from the substrate. (Page 4, line 28). However not enough energy is applied to cause remelting of the fluid. (Page 5, lines 1-2). In contrast, Kroll does not teach the removal of a solid layer. Kroll applies and freezes a layer of water, but then liquefies the water. Kroll teaches any method of heating works well, “so long as the solidified medium is substantially liquefied and/or evaporated.” (Column 3, lines 66-68). Moreover as the Examiner acknowledges, Kroll is silent as to sonic energy. (Examiner’s point 11).

2. Applicant’s arguments have been carefully considered and are persuasive. The argument “said solid layer” is removed is understood to be the solid layer described in the third line of claim 1. While it is believed to be inherent that the layer removed in Kroll may be substantially complete with a softened or melted interface area. The claim clarification coupled with applicant’s arguments makes it clear that the sonic energy does not melt the frozen fluid but mechanically separates the same from the substrate. For at least the foregoing the anticipation rejection in view of Kroll of claims 1-5, 7-12, 17, and 18 is withdrawn.

3. With respect to Sakai Applicant argued:

The present invention forms a solid layer of ice on the surface of the substrate having contaminants thereon. In contrast to forming a solid layer, Sakai forms pieces of ice around individual contaminant particles as condensation nuclei. (Figure 2; column 1, lines 64-5; column 4, lines 28-30). Moreover, Sakai does not teach removing the ice with sonic energy. Rather Sakai blows the ice with high-pressure gas.

4. The arguments have been carefully considered but are not persuasive. Specifically, Applicant’s argument “Sakai forms pieces of ice around individual contaminant particles as condensation nuclei” it is unclear how this differs from the present invention. Is applicant suggesting that the ice is not formed on the substrate? Absent this reading why would the

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contaminates not serve as points of nucleation? Even assuming that these questions could be adequately resolved, column 2, line 13 *et seq.* discloses:

*** comprising: cooling means for cooling a substrate to below zero; wet gas supply means for supply a gas containing atomized water to the surface of the substrate cooled by the cooling means to form ice on the surface of the substrate; and ice removing means for removing the ice formed on the surface of the substrate.

5. And column 3, line 24 discloses:

The apparatus includes an ice forming unit 10 for cooling a substrate W, *** and taking the substrate W having ice formed on its surface out of the ice forming unit 10...”.

6. This examiner simply does not read the Sakai reference as narrowly as applicant. The suggestion that ice only forms around contaminant particles simply is not supported.

Additionally, applicant’s argument:

Moreover, Sakai does not teach removing the ice with sonic energy. Rather Sakai blows the ice with high-pressure gas.

is contrary to the explicit teachings of Sakai:

7. At e.g. column 7, line 62 *et seq.* Sakai discloses:

The ice removing unit 20 may be constructed without the adoption of high pressure gas ejection. For example, the ice may be separated from the surface of the substrate W by applying ultrasonic waves and eliminated by the action of a centrifugal force resulting from the rotation of the substrate support 211. (Emphasis added)

8. Applicants’, in the specification at page 5 line 6, state:

The sonic energy employed typically has a frequency of at least about 5 Hertz and up to megasonic values. If desired, oscillation harmonic of the fluid/wafer can be applied. The time and power of the sonic energy can be carried commensurate with removal of the frozen film, which can be determined by persons skilled in the art without undue experimentation once aware of the present disclosure. (Emphasis added).

9. Once applicant has defined a term in the specification, and the term appears in the claims, the term shall be construed in a manner consistent with the specification. See MPEP 2111.01

Specifically, during examination, the claims must be interpreted as broadly as their terms

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reasonably allow. This means that the words of the claim must be given their plain meaning *unless* applicant has provided a clear definition in the specification. *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). The clear definition provided in the specification is deemed to control in this case.

10. With respect to the 35 USC §103(a) rejection of claims 14-16 and 23-33, applicant argued:

The references taken as a whole or severally fail to teach the removal of a solid layer.

11. Since the rejection of claim 1 with respect to Kroll is withdrawn, the reference would not properly be used in dependant claims. Similarly, claim 23 includes the distinguishing limitation, as discusses above with respect to claim 1 and thus is similarly overcomes the Kroll reference. For at least the foregoing, the 35 USC §103 rejection of Kroll in view of Collier is withdrawn. The additional rejections using Kroll are similarly withdrawn in light of the instant amendments and arguments as discussed above with respect to claim 1.

12. As to the arguments with respect to claims 23-33 made pursuant to 35 USC § 103(a) in view of Sakai and Collier and claim 34, further relying on Williams, applicant argued:

As discussed above, Sakai does not forma solid layer. Rather Sakai from individual ice particles around contaminants as condensation nuclei. (Figure 2). Collier is not properly combinable with Sakai, because, as discussed above in connection with Kroll, Collier teaches a method for the prevention of forming a solid layer on a surface.

13. As indicated above Sakai *does* teach the formation of ice on the surface.

Claim Objections

14. Applicant's arguments were found persuasive with respect to Kroll, in part because of the statement "however not enough energy is applied to cause re-melting of the fluid. (Page 4, lines 1-2)." This statement is troubling in light of the disclosure in claim 17 disclosing: "heat energy is applied to the substrate." How does the heat energy avoid "re-melting of the fluid"? If this is not adequately and satisfactorily addressed, the Kroll rejection(s) may be reinstated. Kroll discloses melting the ice layer, specifically: the "wafer is then heated to remove the medium and photoresist from the wafer." Heating the wafer with the ice layer on it will result in the separation of separation of the solid layer and including contaminants from the surface. Where separation is understood to mean physical separation of a layer from the substrate, as by the introduction of an intervening layer of fluid.

Claim Rejections - 35 USC § 102—Withdrawn & Maintained/New

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1-5, 7-12, 17, and 18 were rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,451,295 to Kroll (Kroll). The rejection is withdrawn for the reasons set forth above.

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16. Claims 1-12, 14-21, 23-33 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,857,474 to Sakai et al (Sakai).

17. Sakai reads on the reference as follows: Sakai discloses a method for removing contaminants from the surface of a substrate (washing a substrate/wafer) which includes applying a fluid to the surface (supplying a gas containing atomized water to the surface of the substrate); lowering the temperature of the fluid so as to form a solid layer of the fluid over the surface (cooling a substrate to below zero and forming ice on a surface of the substrate). Inherently these steps will entrap contaminants. Applying energy to the layer or substrate or both under such conditions as to result in separation of the layer including the contaminants (dust and brush particles) from the surface (removing the ice formed on the surface of the substrate). The energy disclosed in Sakai is in the form of vibratory energy from impinging particles. See e.g. column 3, line 53 *ET seq.* If applicant persists in the position that the electromechanical energy from the impinging particles is not “energy” as set forth in claim 1, ultrasonic waves are disclosed in Sakai at e.g. column 7, line 62.

18. With specific respect to claims 2, 3, 24, and 25 the method of is directed to a silicon semiconductor substrate (element W in figure 1 and associated text).

19. As to claim 4 and 26, disclosing that an organic material is removed, Sakai teaches removing photoresist. More pointedly, the disclosure of a mere use does not impart patentability. The recitation of the contaminants to be removed does not affect the process in

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any manipulative sense and is given little patentable weight. *In re Tarczy-Hornoch* 158 USPQ 141, 150 (CCPA 1968); *In re Edwards* 128 USPQ 387 (CCPA 1961); *Stalego v. Heymes I* 120 USPQ 473, 478 (CCPA 1959); *Ex parte Hart* 117 USPQ 193 (PO BdPatApp 1957); *In re Freeman* 44 USPQ 116 (CCPA 1940); *In re Sweeney* 72 USPQ 501 CCPA 1947).

20. With specific respect to 5, 6, 27-29 disclosing that the fluid comprises water, pure water is disclosed (element 24 of figure 1 and associated text).

21. With specific respect to claim 7, 8, 30, and 31 disclosing that the energy is applied to the layer/substrate, the same is disclosed see e.g. column 1, line 54 *et seq.* The energy is in the form of sonic energy see e.g. column 7, line 62 *et seq.*

22. With specific respect to claim 10 the temperature of the fluid is lowered by directly reducing its temperature. See e.g. column 1, line 51 *et seq.* (wafer is cooled and directly cools the water that is applied).

23. With specific respect to claim 11, 12, 32, and 33 disclosing that the temperature of the fluid is lowered by employing a cryogenic gas in the solid or liquid phase. See e.g. column 2, line 21, disclosing that the cooling fluid is “liquefied nitrogen”. The cooling fluid is the means by which the substrate and cleaning fluid are chilled to “below zero”. See e.g. column 2, line 1 *et seq.*

24. Claim 14-16, disclosing sonic energy is rejected in view of the disclosure at see e.g. column 7, line 62 *et seq.* and discussion above. Inherently the sonic energy is applied to the substrate and the layer either directly (which is apparently contemplated by Sakai) or indirectly via transmission through the ice layer.

25. As to claims 17 and 18, disclosing, “heat energy is applied” one presumes that “to the wafer/ layer system” is further contemplated. The ultrasonic energy is transformed to heat energy through electromagnetic radiation attenuation in the system.

26. As to claims 19-21, disclosing that the temperature of the liquid is lowered by reducing the temperature of the substrate. See e.g. column 1, line 45 *et seq.* and that cryogenic nitrogen is used, the same is disclosed in Sakai “[t]he cooling medium may be preferably liquefied nitrogen.” See e.g. column 2, line 20 *et seq.*

27. Claims 1, 23 and 3, 25, and 5, 27, and 7, 8, 30, 31, and 9, 10, and 14-16 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,724,186 to Collier (Collier).

28. Collier and claims 1, 23 and 3, 25, and 5, 27, and 7, 8, 30, 31, and 9, 10, and 14-16 disclose a method of removing contaminants (foreign particles and matter entrapped by the layer of ice see e.g. column 2, line 1 *et seq.*) from the surface of a silicon substrate (rearview mirror see e.g. Title) which comprises applying water to the surface (exposing to rain); lowering the

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temperature of the water so as to form a solid layer (exposing to a subfreezing environment) of ice over the surface and entrapping contaminants within the layer; wherein the fluid is applied at ambient temperature (rain), and the temperature of the water is lowered by directly reducing its temperature (placing the mirror in the freezing environment) and applying sonic energy to the layer or substrate or both under such conditions as to result in separation of said solid layer including the contaminants from the surface (the bonds between the mirror face and other solid deposits including ice are quickly broken allowing the debris to fall clear. Abstract)

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 13, 22, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai as discussed above and United States Patent No. 4,491,484 to Williams. Specifically, claims 13, 22 and 26 are directed to an embodiment where the cryogenic fluid is carbon dioxide, the prior art of record discloses the claimed invention except that carbon dioxide is not explicitly disclosed. Williams shows that cryogenic carbon dioxide and cryogenic nitrogen are equivalent. Therefore, because these two cryogenic fluids were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute cryogenic nitrogen for cryogenic carbon dioxide.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (703) 305-3403. The examiner can normally be reached on Monday-Friday 7:00-3:30.

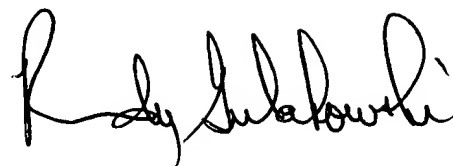
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. The direct fax number for this examiner is (703) 746-7746.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gentle E. Winter
Examiner
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August 18, 2003

A handwritten signature in black ink, appearing to read "Randy Gulakowski". The signature is fluid and cursive, with the first name "Randy" and last name "Gulakowski" clearly distinguishable.

RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700